Fig. 1

(PRIOR ART)

BASEBAND INPUT

XMTR — 12

14

16 17

20 22

RCVR A — 24

RCVR B — 26

COMBINER — 28

BASEBAND OUTPUT

10

Fig. 2

(PRIOR ART)

BASEBAND INPUT

XMTR A — 32

XMTR B — 34

36

38 40

42

RCVR A — 44

RCVR B — 46

COMBINER — 48

BASEBAND OUTPUT

30

Fig. 3

50

Data Input	Outer FEC Encoder	Interleaver	Inner FEC Encoder	Modulator	Tx

52   *54*   *56*   *58*   *60*

62

64

Tx Channel

66

Rx	Demodulator	Inner FEC Decoder	Deinterleaver	Outer FEC Decoder	Data Output

68   *70*   *72*   *74*   *76*

Fig. 4

80

$F_1(t)$
$I_U(t)$
$F_2(t)$ 82   84 $F_3(t)$

| Modulator | IF | Up Converter | MW | MW Power Amplifier |

$Q_U(t)$

carrier
$\sin(w_M t)$

| MW Oscillator |

86

88

90

Transmission Medium   91

92

$F_4(t)$ 96 $F_5(t)$ $F_6(t)$ 102

| Low Noise Amplifier | MW | Down Converter | IF | AGC IF Amplifier | IF | Demodulator | $I[C'(t)]$ |

$Q[S'(t)]$

| MW Oscillator |

94

98

100

carrier
$\sin(w_{IF} t + d)$

Fig. 5

Optional
FEC
Processing

194

Data Selector

200

I_1 Q_1
CI_1

I_2 Q_2
CI_2

I_L Q_L
CI_L

140

Conventional Receiver *180*

Demodulator

190

IF Amp.

D/C

LNA

150

160 *170*

Conventional Receiver *180*

Demodulator

190

IF Amp.

D/C

LNA

150

160 *170*

Conventional Receiver *180*

Demodulator

190

IF Amp.

D/C

LNA

150

160 *170*

Antenna Feed

192

192

· · · ·

Fig. 6 Block Diagram of the Diversity Signal Data Selector System
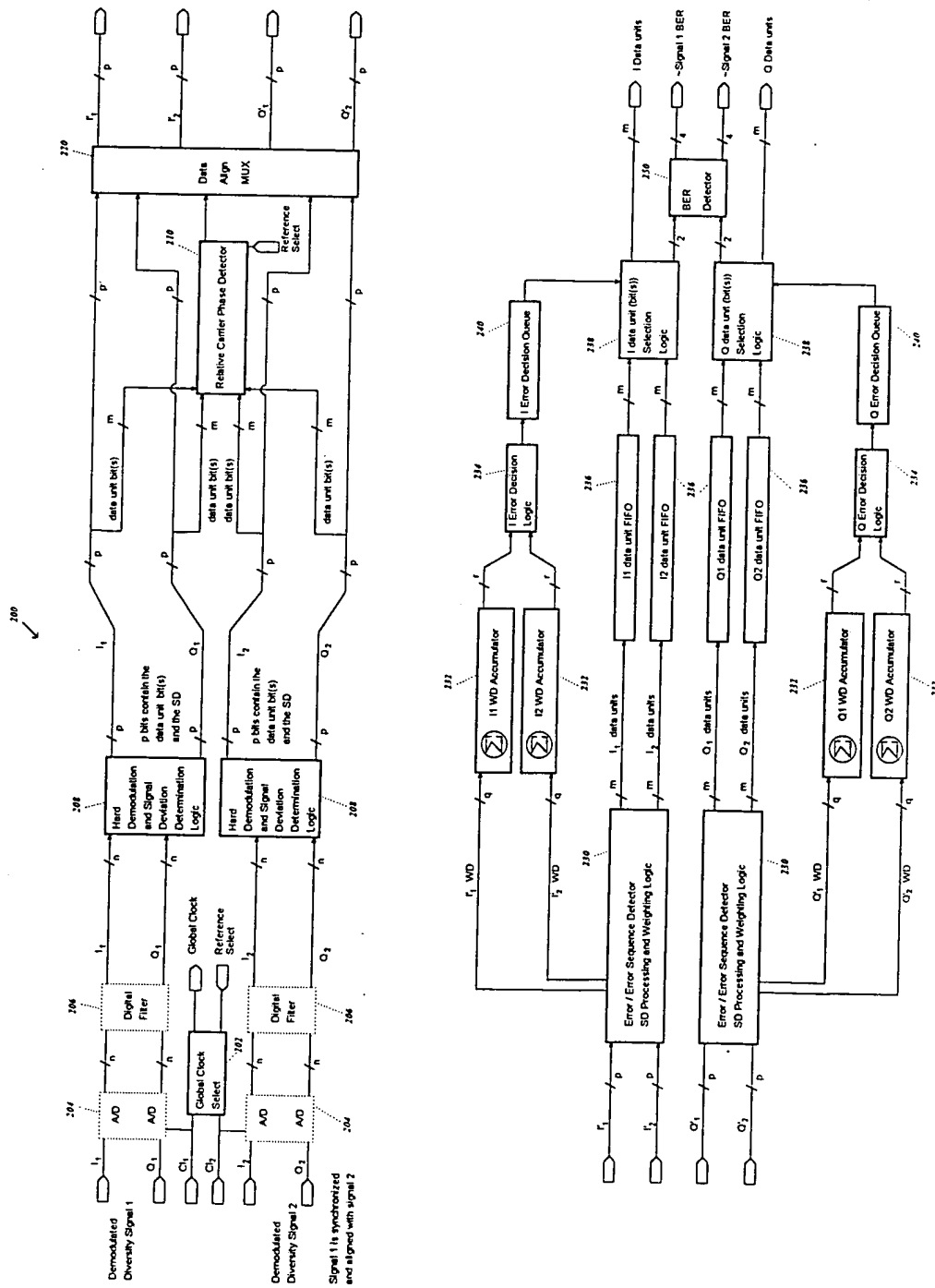
Fig. 7 Global Clock Select
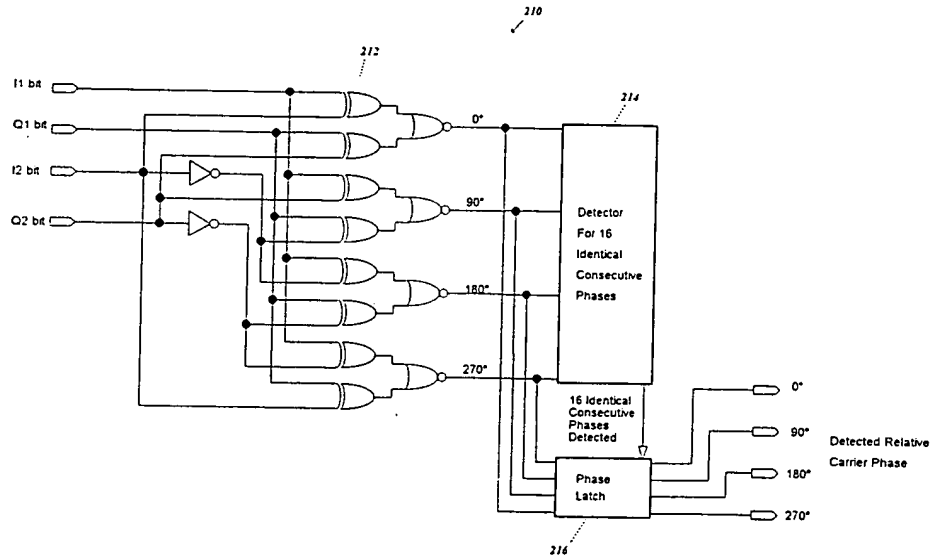

Fig. 7 Global Clock Select
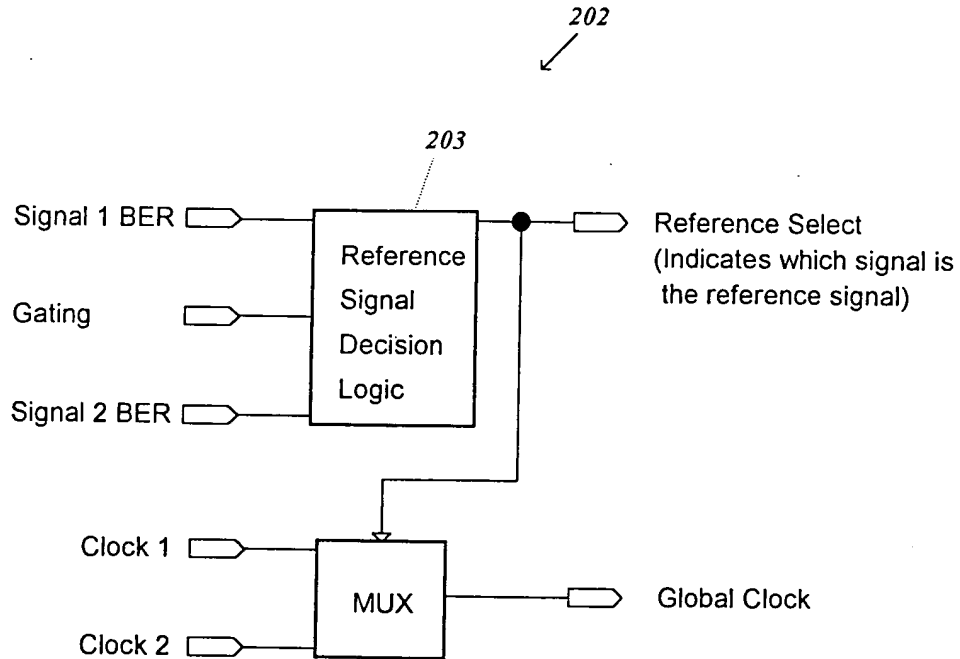
Relative Carrier Phase Detector

Data Align Multiplexer

Fig. 9 BER Detector

250

252

Individual Component Error Counters

I Error On Diversity Signal 1
I Error On Diversity Signal 2
Q Error On Diversity Signal 1
Q Error On Diversity Signal 2

16
16
16
16

256 Accumulator
256 Accumulator

Total Errors On Diversity Signal 1
Total Errors On Diversity Signal 2

Gating

16
16

258

Comparators

3 Signal 1 BER
Gating
3 Signal 2 BER

16 bit Counter For BER Gating
254

Signal BER of
0 ~ 1 x 10^1
1 ~ 5 x 10^2
2 ~ 1 x 10^2
3 ~ 5 x 10^3
4 ~ 1 x 10^3
5 ~ 5 x 10^4
6 ~ 1 x 10^4
7 < 1 x 10^4

Fig. 10 Expected and Measured BER for 9QPR Radio Using Diversity Signal Selection

[971104]

Curve 1
Measured Signal 1 BER

Curve 2
Measured Signal 2 BER

Curve 7
Ideal Selector Output

Curve 3
Measured Selector Output - Equally Faded Signals
(Diversity Gain = 1)

Curve 4
Expected Selector Output
(Diversity Gain = 10)

Curve 5
Expected Selector Output
(Diversity Gain = 100)

Curve 6
Expected Selector Output
(Diversity Gain = 1000)

BER

10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}

Eb/No (dB)

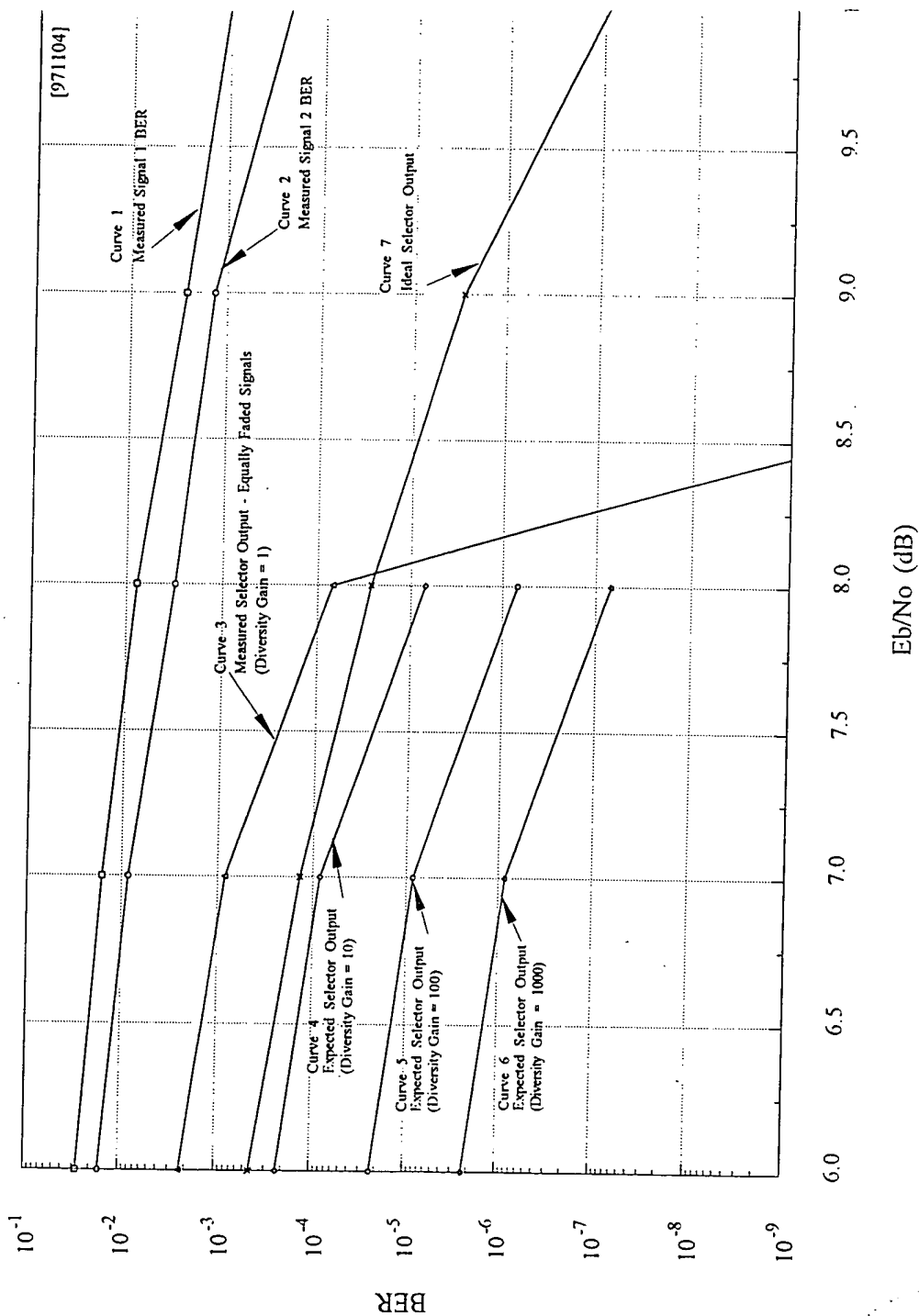6.0   6.5   7.0   7.5   8.0   8.5   9.0   9.5

Fig. 11 Expected BER Characteristics of Unprotected and Diversity Protected QPSK Radio

Curve 1
Single-Signal Uncoded

Curve 2
Two-Signal Diversity Selection, Uncoded
(simultaneously and equally faded signals)

Curve 4
Single-Signal ITU Coded

Curve 3
Three-Signal Diversity
Selection, Uncoded

Curve 5
Two-Signal Diversity
Selection, ITU Coded
(simultaneously and equally faded signals)

Expected Receiver Operation Limit

Eb/No (dB)

BER